

Armed Forces College of Medicine

AFCM



Pathology of bone tumors (2)

INTENDED LEARNING OBJECTIVES (ILO)



By the end of this lecture the student will be able to:

1. **Analyze the clinico-pathologic features of chondrosarcoma.**
2. **Analyze the clinico-pathologic features of Ewing's sarcoma.**
3. **Recognize basic facts related to bone metastasis.**
4. **List causes of pathological fractures.**
5. **Define osteodystrophy & list its causes.**
6. **Discuss pathology of fibrous dysplasia.**
7. **Mention etiology, and pathologenesis of Paget's**

Lecture Plan



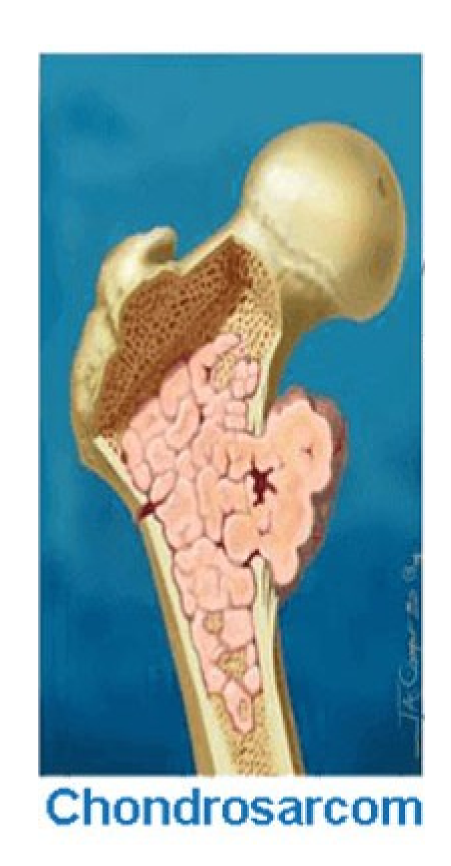
1. Part 1 (5 min) Introduction
2. Part 2 (35 min) Main lecture
3. Part 3 (5 min) Summary
4. Lecture Quiz (5 min)

CHONDROSARCOMA-2



- Chondrosarcoma is less common than osteosarcoma
- **Origin:**

  It is a malignant neoplasm characterized by **chondrogenic cells** ----> secreting cartilagenous matrix.
- **Predisposing Factors:**
  - Paget's disease of bone.
  - Fibrous dysplasia.
  - Chondroma
  - Osteochondroma.

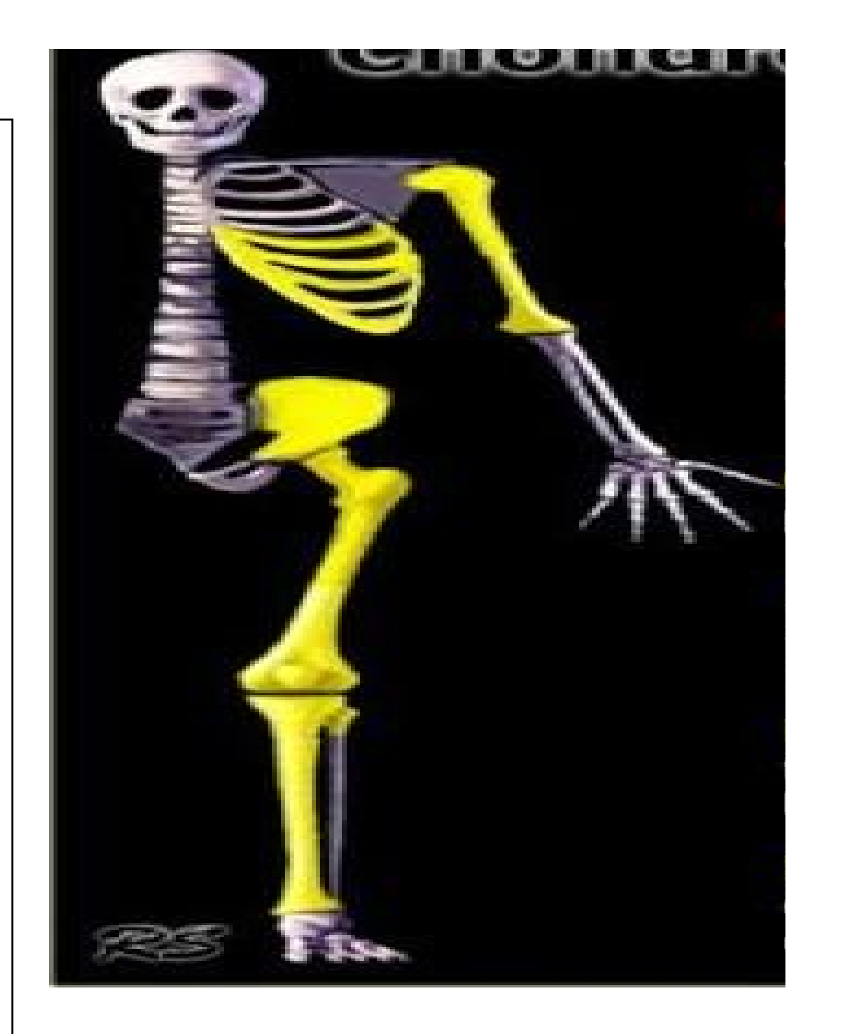


https://www.oncoplus.co.in/category/blogs/bone-cancer/

CHONDROSARCOMA-2



- **Age:** The **4th decade** is the most common, but younger and older ages may be affected
- **Site :** Bones in the **central portions of the skeleton (pelvis, shoulder &ribs)** but any bone could be affected



CHONDROSARCOMA-2



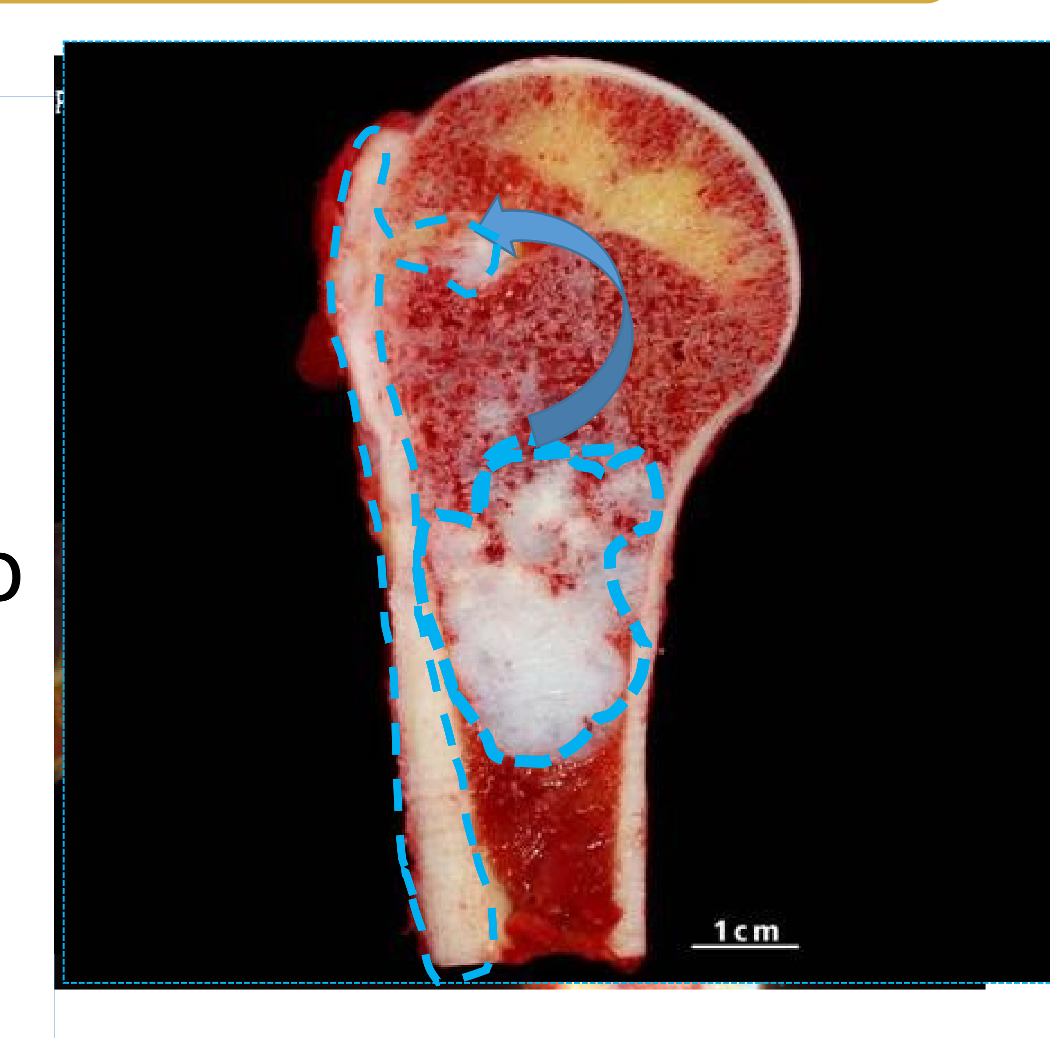
Radiological Features:

Popcorn (mottled) densities due to spotty calcifications are commonly detected.

CHONDROSARCOMA-2



- **Gross:**
- The tumor grows within the **medullary canal**.
- **Penetrate the cortex and periosteum** ---> extends into the adjacent soft tissues
- Areas of **necrosis and hemorrhage**.
- Has **bluish grey translucent** cut section
- **Chalky white Calcifications**



https://www.cambridge.org/core/books/silverbergs-principles-and-practice-of-surgical-pathology-and-cytopathology/neoplastic-and-tumorlike-lesio bone/9F7C14CDEDE4D597BD1DFD0B447EC861

CHONDROSARCOMA-2



Microscopic Features:

- **Tumor cells:** Pleomorphism, large dark nuclei and frequent mitoses.
- **Hyaline matrix:** according to the degree of differentiation

+++ matrix in low grade tumors.

---- matrix in high grade tumors.

CHONDROSARCOMA-2

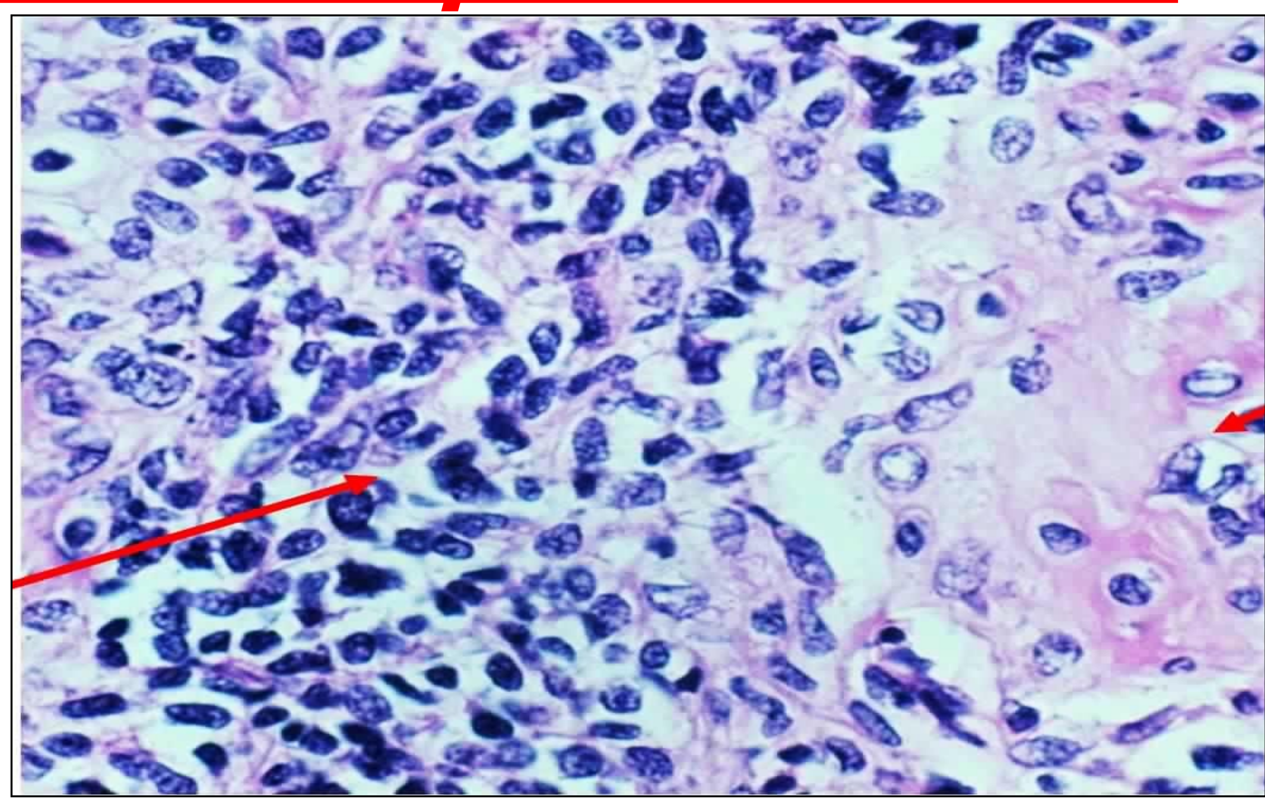


Malignant chondrocytes in lacunae

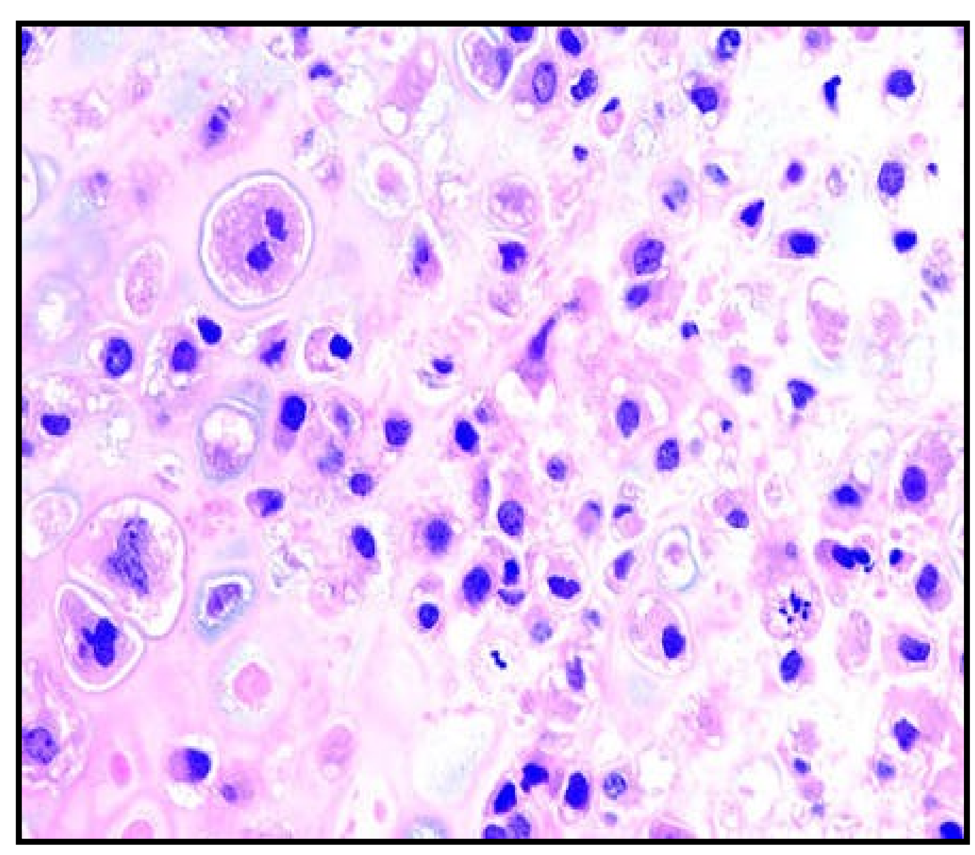
CHONDROSARCOMA-2



Microscopic Features:



http://www.tumorsurgery.org/tumor-education/bone-tumors/types-of-bone-tumors/mesenchymal-chondrosarcoma.aspx



http://www.pathologyoutlines.com/topic/bonechondrosarcoma.html

CHONDROSARCOMA-2



Spread:

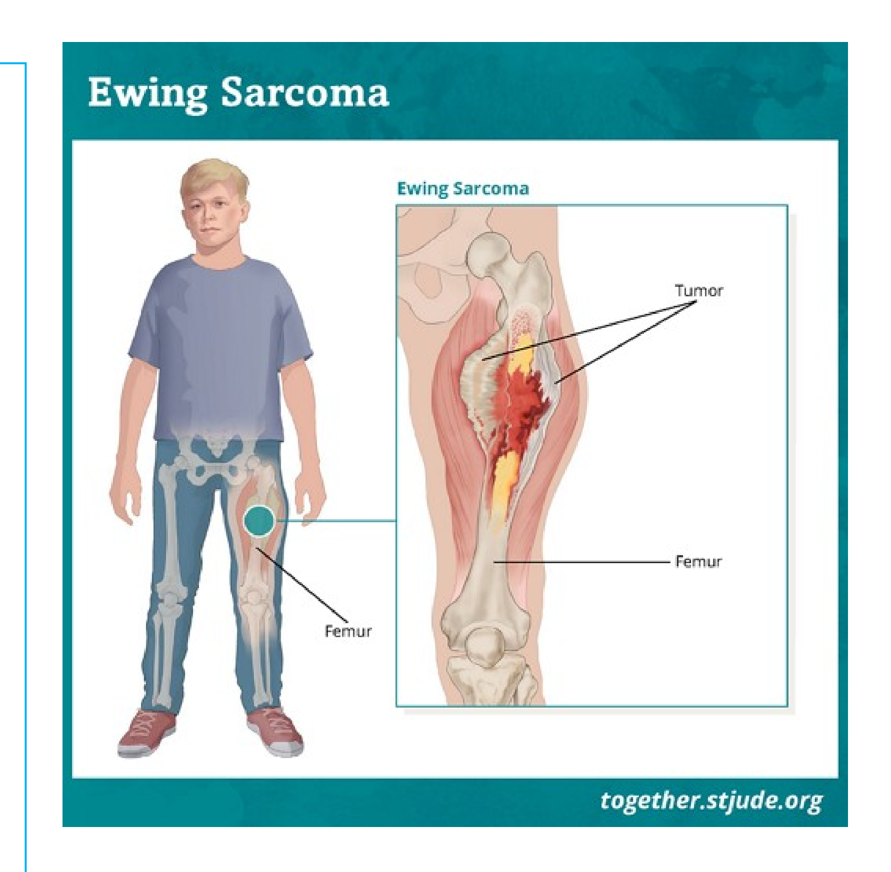
1. **Low grade chondrosarcoma spreads locally with no distant spread .**
2. **High grade chondrosarcoma spreads locally and by blood (similar to osteosarcoma)**

Prognosis: Generally better than osteosarcoma

Ewing's sarcoma-3



- ***Definition***: It is a malignant neoplasm of undifferentiated cells arising within the marrow cavity.
- ***Age*:** 5-20 years.
- ***Aetiology:*** The classic translocation for Ewing sarcoma is t(11;22), which produces the EWS-FLI1 fusion protein.



https://together.stjude.org/en-us/about-pediatric-cancer/types/ewing-sarco

EWING’S SARCOMA-3



Origin and Sites:

- The origin is unsettled; recently believed to be of neural origin from primitive neuroectodermal cells
- In the **medullary canal** of the **diaphysis** of long bones especially the **femur** or in the **flat bones** of the pelvis.
- It may also arise in soft tissues (& is called primitive neuroectodermal tumor ; **PNET**).



Age: **5-20 years**, but may occur in older age groups (PNET).

EWING'S SARCOMA-3



- **Painful tender swelling** that may be clinically confused with osteomyelitis.

- **Radiological Features:**
- Osteo**lytic** destructive bone lesion **periosteal reaction** layers of reactive bone deposition **(onionskin-like fashion)**

EWING'S SARCOMA-3



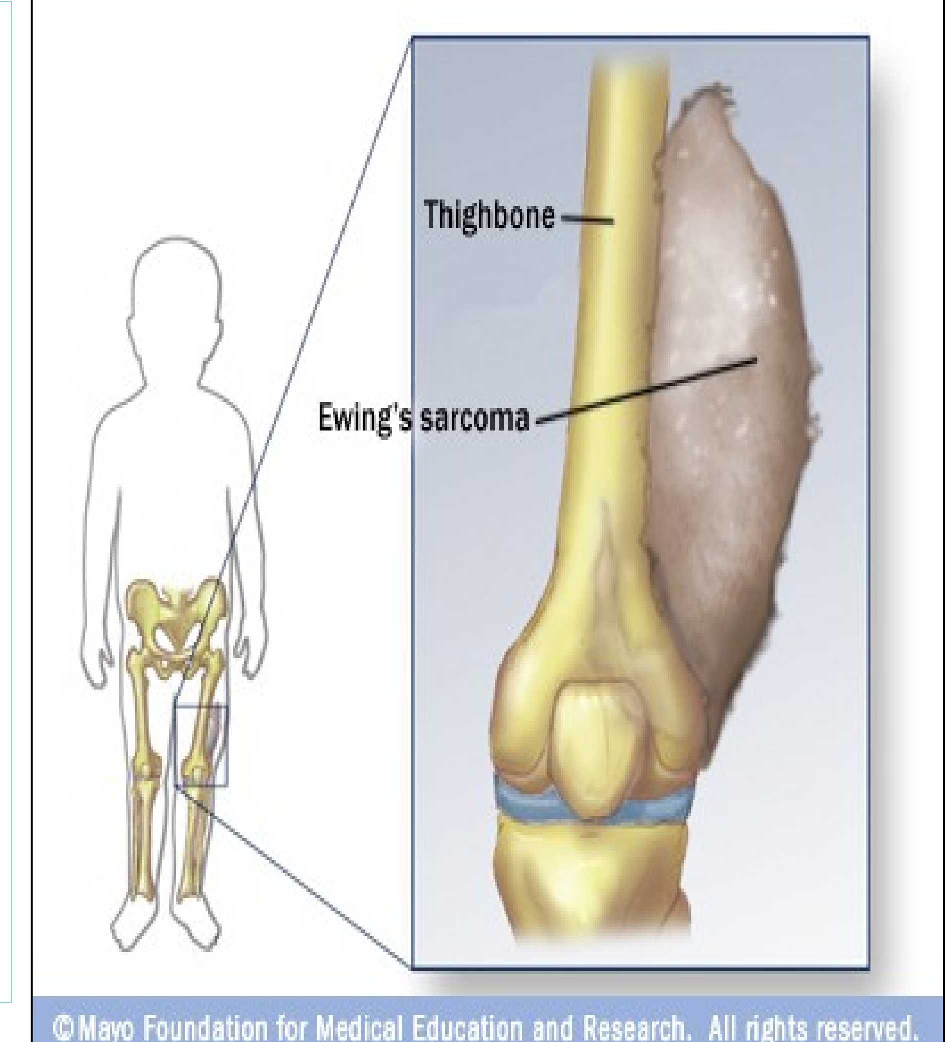
Gross:

A **soft mass** with extensive **necrosis** and **hemorrhage** that destroys the bone cortex.

Microscopic:

Round cells with **dark nuclei**, (confusing with lymphoma & neuroblastoma) their cytoplasm characteristically contains **glycogen**

Spread: Direct and by blood



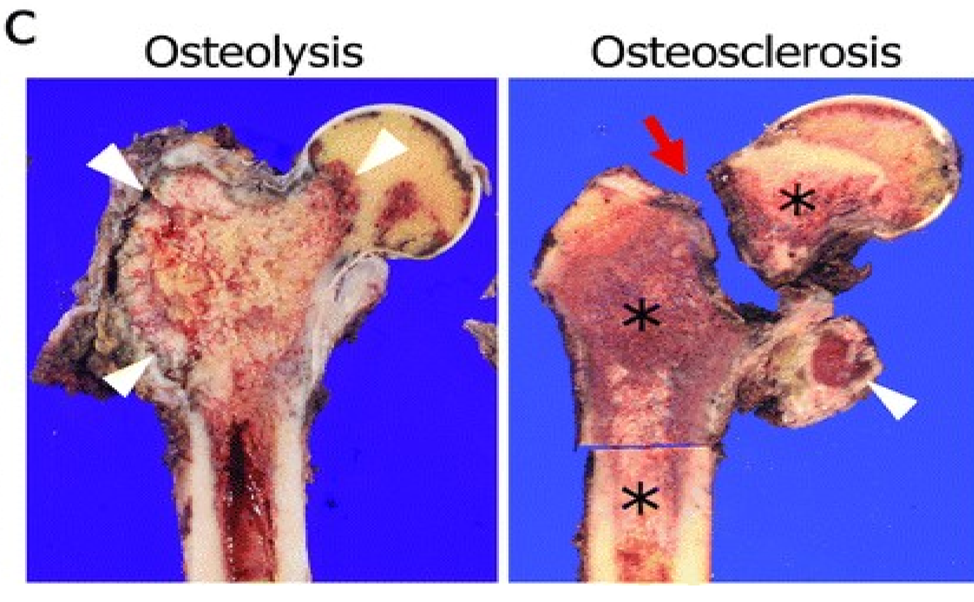
EWING'S SARCOMA-3



Bone Metastasis



- **Metastasis to bone is <u>much more common</u> than primary bone tumor.**
- Bony metastases of carcinomas predominate over the sarcomas.
- Common primary sites: include prostate (often osteoblastic), breast, lung, thyroid, and kidney



https://www.frontiersin.org/

https://www.researchgate.net/figure/Clinical-presentation-of-bone-metastases-a-A-full-body-bone-scan-in-a-breast-cancer_fig6_301252751

CAUSES OF PATHOLOGICAL FRACTURE



1. **Inflammatory disease** (acute osteomyelitis, chronic osteomyelitis…).
2. **Osteodystrophies:** Abnormalities of bone growth & structure
   Osteoporosis, fibrous dysplasia, Paget’s disease,
   hyperparathyroidism, rickets, osteomalacia
3. **Primary malignant tumors**
4. **Metastases.**
5. **Bone cysts** (as aneurysmal cyst &

https://quizlet.com/40723805/pathology-chpt-26-types-of-fractures-in

Lecture Quiz



A tumor arises in the upper tibia, grossly appearing as a mushroom shaped mass:

a. This is a benign tumor.
b. It arises also in skull bones.
c. It originates from medullary canal.
d. Is called exotosis.
e. Spreads by blood

SUGGESTED TEXTBOOKS



1. Robbins basic pathology, ninth Edition
2. Kaplan step 1 pathology lecture notes 2017 (P.78-98)